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Changes of terrestrial water storage from GRACE-derived gravity records in India

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Investigating the terrestrial water storage changes (TWS) changes is important to understand the hydrological cycle in response to the recent climate variability in India, a country whose economy and food security depend on its water resources. We used the monthly gravity solutions from NASA's Gravity Recovery and Climate Experiment (GRACE) satellites to delineate the spatial-temporal evolution of TWS and groundwater storage (GWS) employing robust statistical tools during 2003 to 2012. Results show large-scale water storage losses, particularly driven by the significant GWS depletion in the intensely irrigated Indo-Gangetic north India in the pre-monsoon (JFMAM), monsoon (JJAS) and post-monsoon (OND) seasons, respectively. Comparison with the rainfall, the Global Land Data Assimilation System (GLDAS) modeled soil moisture and the Palmer Drought Severity Index (PDSI) indicates that a little deficit in monsoon rainfall leads to significant water storage losses. In particular, the indirect effect of climate variability in terms of increases in irrigation demands due to the dry spell in India since 2008, as also observed in the adjacent counties and other overexploited aquifers of the world, has resulted in a marked drop in GWS over the northern parts, suggesting the persistence of droughts on the subsurface component.

Biography

Dileep K Panda has completed his PhD from Indian Agricultural Research Institute, New Delhi in 2000. He is now the senior scientist of the Directorate of Water Management, one of the premium institutes for water management under the Indian Council of Agricultural Research (ICAR). He has published more than 20 papers in international and national journal, and has reviewed papers of Journal of Hydrology, Global and Planetary Change, and many others. He has undertaken many prestigious projects, including the ICAR Challenge Project, that ensured training at University of Colorado, Boulder, and this research is a part of that investigation of GRACE records.

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Impacts of global warming on climate of India and strategies to mitigate its challenges

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Climate change is a driving force of evolution that life on earth has undergone since its origin. The impacts of climate change is engaging the attention of planners, governments and the politicians worldwide since the emergence of the threat of climate change which has origins in anthropogenic activities. There is a growing concern about manmade developments causing, even if partially or insignificantly, the climate change outcomes. Climate change necessarily brings about changes in the weather conditions. There is reason to believe that climate change could affect agricultural productivity, and cause increased health hazards and submergence of lands due to rise in the sea level to name a few. Climate change is the net result of many factors caused by continuous evolution of Planet Earth through many geological eras. The term global warming is synonymous with an enhanced greenhouse effect, implying an increase in the amount of greenhouse gases in the earth's atmosphere, leading to entrapment of more and more solar radiations, and thus increasing the overall temperature of the earth. Climate has played a significant role in the economic development of India. India exhibits a wide diversity of temperatures. The climate of India is dominated by the monsoon season, which is the most important season of India, providing 80% of the annual rainfall. Climate change is net result of several factors and many sectors of the economy are climate sensitive. It is no longer the scientific enquiry but the concern now rather is the timing and magnitude of the abrupt changes in the climate.

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